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THE DEVELOPMENT OF A COLOR PRINT FROM MULTIPLE PLATES  
UTILIZING INTAGLIO AND RELIEF PROCESSES

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Master of Fine Arts

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Murray Charles Kalis

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Murray Charles Kalis

Approved by Committee:

Leonard Boss  
Chairman

Richard Black

Earl J. Canfield  
Dean of the Graduate Division

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## CHAPTER I

### INTRODUCTION AND GENERAL CONSIDERATIONS

Color printmaking as an art form was traditionally subordinated to the task of reproducing paintings and color drawings.<sup>1</sup> Two recent developments changed its status to that of a fine art. When color photographic reproductions of high fidelity could be reproduced mechanically, the earlier types of handmade color prints became not unnecessary but unprofitable. Of even more importance, artists began to consider the possibilities of the color print as a true creative means of expression.

Many new ways of obtaining color prints have been devised. Most of these ways are aimed at printing several colors from a single plate by combining intaglio and relief processes. This is done by carrying color on the surface of the plate (relief) as well as in depressions beneath the plane of the surface (intaglio). The traditional method is to use a separate intaglio plate for each color. The writer felt

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<sup>1</sup>The term color printmaking as used in this paper refers specifically to the intaglio processes with copper plates. This excludes color prints in the media of woodcut, serigraphy, lithography, etc., which do not make use of the worked copper plate to produce the printed image.

both approaches could be used to develop a print having great variety and few technical limitations.

This study will trace the development of that print. The study will present a survey of the history of color printmaking as it concerns the project. Also, the different methods of color printmaking will be compiled. Then, the development of a color print using multiple plates with both intaglio and relief processes will be discussed. Following a consideration of the material and equipment that were used, a summary of the work and conclusions concerning the project will be made.

## I. THE PROBLEM

The purpose of this study was to develop a color print using multiple plates with both the intaglio and the relief methods of printmaking. This combined traditional multiple plate intaglio processes with the newer single plate intaglio-relief methods of color printmaking. This combination was used to develop a color print which could not have been made using either method alone.

The topic was chosen to depict the development of a color print using multiple plates with both intaglio and relief. This is important because it displays technical versatility. This study will also provide a survey of the methods of color printmaking.

## II. HISTORY OF COLOR PRINTMAKING

Before this century, nearly all color prints were made using the multiple plate method. However, two exceptions may be found in the works of Hercules Seghers and William Blake.<sup>1</sup> The experimentation done by these two men, whose individual work was separated by more than a century, is the only creative work of past etchers that ties in with recent single plate color printing developments.<sup>2</sup> In the past, it was a matter of tradition to complete a plate by one means, such as etching or engraving.

The Dutch printmaker, Hercules Seghers (1590-1640/5), received little recognition during his time.<sup>3</sup> Contemporary concern with single plate color printmaking, as well as the creative use of color, has led art historians and printmakers to reevaluate Seghers' work and methods.

For many years, Seghers' color prints were assumed to be colored by hand. This would eliminate them as true color prints, since they could not be reproduced (or printed) from

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<sup>1</sup>Gabor Peterdi, Printmaking Methods--Old and New (New York: The MacMillan Co., 1959), p. 170.

<sup>2</sup>Ibid.

<sup>3</sup>Carl Zigrosser, The Book of Fine Prints (2d ed. rev.; New York: Crown Publisher, Inc., 1948), p. 85.

the same source, and thus no two prints would be identical. This assumption was not without some basis because many of Seghers' prints were colored by hand.

After the development of intaglio-relief printing (single plate color printing), Stanley William Hayter, who will be discussed shortly, examined many of Seghers' prints. He concluded some were actually a result of color printing and not hand colored.<sup>1</sup> Hayter makes reference to their revolutionary character in the following passage from his book, New Ways of Gravure.

Though many of the prints could have been printed over paper previously colored with watercolor and could have been retouched with color after printing, I do believe, in certain examples, where the color varies very exactly with the form, yet is clearly under the line, that he anticipated the simultaneous intaglio and relief color method used by Atelier 17.<sup>2</sup>

Hercules Seghers was driven by his creative urge to use color in his prints. Unfortunately, he was an exception. The use of color in prints was viewed by other printmakers (excluding William Blake) as a means of more exactly reproducing works in other mediums, such as paintings or drawings.

The first color intaglio prints were made by Christopher

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<sup>1</sup>Stanley William Hayter, New Ways of Gravure (New York: Pantheon Books, Inc., 1949), p. 133.

<sup>2</sup>Ibid., p. 204.

Le Blon (1670-1741), beginning in 1720.<sup>1</sup> He used multiple plates by printing three color plates and then overprinting with a black plate.<sup>2</sup> This approximated the four-color process method used by commercial printers today.

William Blake (1757-1827) was largely responsible for perpetuating the use of color to further the printmaker's creative expression. Like Seghers before him, he forecast the contemporary use of relief in metal plate printmaking. His technique was also misunderstood until recently.

Blake's use of relief came about because of a need to publish his poetry. Since he could not afford to have his work reproduced commercially by letterpress, he was forced to find another means to publish his work inexpensively. To do this, he used a method of relief biting.

Blake, after deeply perplexing himself as to the mode of accomplishing the publication of his illustrated songs, without their being subject to the expense of letter press, his brother Robert stood before him in one of his visionary imaginations, and so decidedly directed him in the way in which he ought to proceed that he immediately followed his advice by writing his poetry, and drawing his marginal subjects of embellishments in outline upon the copper plate with an impervious liquid, and then eating the plain parts or lights away with aquafortis [acid] considerably below them, so that the outlines were left as a stereotype. The plates in this

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<sup>1</sup>Keefe Leroy Baker, "Concepts and Methods of Color Printing" (unpublished Master's thesis, State University of Iowa, Iowa City, 1956), p. 14.

<sup>2</sup>Ibid.

state were then printed in any tint that he wished, to enable him or Mrs. Blake to color the marginal figures in imitation of drawings.<sup>1</sup>

Blake was able to utilize this inexpensive method to print his works. He produced entire books combining texts, illustrations, and marginal decorations. The first book, printed in 1789, was titled Songs of Innocence. Later on he received commissions to illuminate The Book of Job and Dante's Divine Comedy in his own style, and with his unique method of color printing. John Canaday, art historian and the Art News Editor with the New York Times, describes the illustrations Blake produced for these works as "the finest examples of his eccentric genius."<sup>2</sup>

Mary Cassatt (1845-1926) made original color prints using the traditional methods of multiple plate color printmaking. Her work was greatly influenced by Japanese block prints. Unlike her impressionist companions, she used prints as an individual creative medium and not as forms of drawing.<sup>3</sup>

The beginnings of modern printmaking are found in the work of Jaques Villon (1875-1963). He began as a reproductive printmaker, but around 1910 he began to use line to construct

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<sup>1</sup>Zigrosser, op. cit., p. 150.

<sup>2</sup>John Canaday, Mainstreams of Modern Art (New York: Holt, Reinhardt and Winston, Inc., 1962), p. 253.

<sup>3</sup>Ibid., p. 228.

cubist space.<sup>1</sup> His color prints were made with several plates.

Each plate carried its color in a series of parallel lines. When printed, the lines would be closely adjacent to each other, causing a visual mixture of color. Even in the deepest color areas, there was always enough transparency to allow white to show through, creating colors of great brilliance.<sup>2</sup>

From the work of Jaques Villon and other printmakers, Stanley William Hayter (b. 1901) recognized the latent possibilities of intaglio printmaking.<sup>3</sup> He set up a workshop at 17 Rue Campagne Premier in Paris. Many young printmakers came to experiment with intaglio printmaking under the guidance of Hayter.

About 1931, experimentation in single plate color printing by simultaneous relief and intaglio processes was begun.<sup>4</sup> Many of the methods employed today were developed at Atelier 17. Hayter was particularly interested in the

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<sup>1</sup>Hayter, op. cit., p. 214.

<sup>2</sup>Transparency, as used in this project, refers to the visual transparency created in otherwise opaque passages by separating the color into lines or dots. By doing this, other colors or the white paper will show through the spaces between these dots.

<sup>3</sup>Hayter, op. cit., p. 137.

<sup>4</sup>Ibid.

stencil process of applying color to the plate.

One of Hayter's more famous students was Mauricio Lasansky (b. 1914). His creative work has had a great influence on American printmaking today.<sup>1</sup> Lasansky's first color print, La Lagrima, was completed in 1945. Since then he has produced many color prints, some having as many as nine plates. He is currently a Professor at the State University of Iowa, Iowa City, Iowa.

### III. METHODS OF OBTAINING COLOR

Color printmaking raises problems that are not encountered with the black, one color print. Color inks do not always behave in the same manner as black ink. They may be too stiff to wipe, or so runny they will accidentally mix with other colors. In addition, there is the problem of printing several plates in exactly the same position for each print, or in single plate color printing, inking the plate so the colors are in the same position for each printing. Most important, the printmaker must be concerned with the aesthetic relationships of several colors.

A particular concern of the writer was the selection of the methods to use in adding color to the print. To pro-

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<sup>1</sup>Carl Zigrosser, "Mauricio Lasansky," Lasansky Retrospective Exhibition Catalog (New York: The American Federation of Arts, Inc., 1960), p. 7.



vide a number from which to choose, a survey was made of the different methods of obtaining color. Those that could apply to the problem will be presented in the following paragraphs.

A requirement of the project was to use more than one plate to develop the print. This is the traditional way of making color prints. The advantage of multiple plate color printing is in the intricacy of intaglio color that can be obtained. This subtle admixture of color can be employed for moody, visual effects.

In the multiple plate method, each plate carries a different colored ink. The printmaker must analyze his preliminary color drawing and decide upon a color separation to be developed on the plates. When the plates are printed, the colors may show in areas, or as in the case of Jaques Villon's color prints, they may be combined so they will mix visually. This juxtaposition of colors to obtain the mixing sensation is important, since the physical overprinting of color results in a loss of quality of the bottom color.

Gabor Peterdi has developed a method of color printing which makes use of several plates but can be accomplished in a single run through the press. To do this, he places small, irregular, copper shapes, each having intaglio color, onto a

larger intaglio plate.<sup>1</sup> All may be run through the press at one time.

The combination of single plate one color printing and multiple plate color printing has been used with success by Mauricio Lasansky. In his method, he prints a single plate twice, each time in a different color. The first color to be printed is yellow ochre, a warm color. Then, the plate is reinked with black, a cool color, and printed exactly over the first impression. This superimposition of warm and cool colors provides a particularly exciting three-dimensional quality.<sup>2</sup>

A simple method of printing several intaglio colors from a single plate is the method known as à la poupée. Color inks are applied to different areas of an etched and aquatinted plate with small pads of rolled canvas or felt, known as "dollies" (poupées).<sup>3</sup> When the plate is printed, the result is "a gradation of tints over the lines and the surface of the print."<sup>4</sup>

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<sup>1</sup>Peterdi, op. cit., p. 214.

<sup>2</sup>Ibid., p. 180.

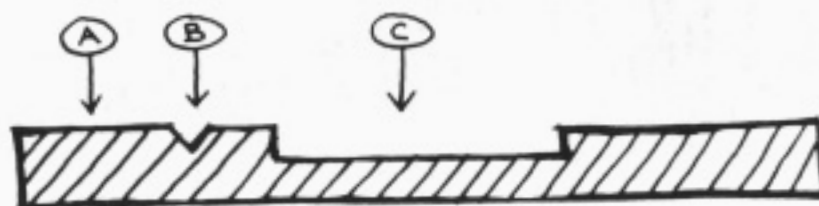
<sup>3</sup>Etching and aquatint are both intaglio processes accomplished with the aid of acid. Etching produces a line and aquatint makes a tonal area.

<sup>4</sup>Hayter, op. cit., p. 131.

À la poupée has never been widely used. Since the method depends on the manipulation of colors over vague areas, it is almost impossible to achieve duplicate prints. For this reason, prints inked à la poupée are usually classed as monoprints.

Another requirement of the project was the print be developed using the relief process as well as intaglio. Since the first experiments with simultaneous printing in color from a single plate inked both intaglio and relief, several variations on the method have been developed. The fundamental concept is still the same. First, the plate is inked intaglio. Then, the surface is wiped clean and a different color is rolled on with a hard inking brayer that will not penetrate the intaglio (Figure 1). A color print may be obtained in a single run through the press.

There are three basic technical problems involved in inking intaglio and relief. First, the relief ink must be deposited on the plate surface in a manner that will avoid a physical mixture with the intaglio ink. Second, it is important the relief color on the surface be a microscopically thin and porous layer of ink, because a thick layer of relief ink will prevent the intaglio ink from adhering to the print. Third, the printmaker must remember practical color transparency is limited to a bitten intaglio texture topped by a



- A. PLATE SURFACE
- B. INTAGLIO CREVICE
- C. RELIEF ETCH

Figure 1. Plate levels in cross-section.

surface color.<sup>1</sup>

Obtaining two colors by inking intaglio and relief is relatively simple and has already been explained. A third color can be rolled on if the plate is designed with a relief etch (Figure 1). This means certain areas of the plate must be exposed to the acid long enough to lower them appreciably below the surface of the plate. John Buckland-Wright gives an excellent description of the method in his book, Etching and Engraving--Techniques and the Modern Trend.

If desired, after the plate has been inked with the first color, a second color can be rolled on with a soft roller. The roller will penetrate the large deep areas and make a second color by contact with the first. The surface of the plate is then cleaned and rolled up with a third color, using a hard roller.<sup>2</sup>

The methods discussed previously have involved the inking of the entire plate. There are instances when the printmaker may desire to ink certain portions of the plate with color. To avoid monoprinting, the inking must be done within specially designated areas.

It is possible to ink definite areas by using stencils

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<sup>1</sup>Ibid., pp. 132 et seq.

<sup>2</sup>John Buckland-Wright, Etching and Engraving--Techniques and the Modern Trend (New York: The Studio Publication, Inc., 1953), p. 136.

cut in the shape of each area. Thus, a plate can hold several different colors, rather than just two or three. Each area, having been inked through a stencil, would be clearly defined.

Stencils may be used to ink the plate either intaglio or relief. When applying intaglio color to the plate through stencils, Gabor Peterdi has found a single surface color is needed to unify the different areas of intaglio color.<sup>1</sup>

When rolling relief color through stencils, it is important to achieve inking in a single roll. Because some intaglio color will be pulled out of the crevices, rolling back and forth has a tendency to muddy the colors.<sup>2</sup>

A relief color cannot be rolled over another relief color to obtain the mixing sensation because of the opacity of the ink. Although color transparency can be created by relief inking over an intaglio inked bitten texture, there is a way to obtain transparency without biting the plate. Stanley William Hayter was the first to do this by using the silk screen to place color on the plate surface.<sup>3</sup>

Silk screen is a stenciling process. It is more complex than a simple stencil, but a wider range of effects are

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<sup>1</sup>Peterdi, op. cit., pp. 168 et seq.

<sup>2</sup>Ibid., p. 188.

<sup>3</sup>Hayter, op. cit., p. 159.

available. Color transparency may be achieved by selecting a heavy gauge silk mesh. When the ink is squeezed through the mesh, it will be made porous, or transparent. The design may be obtained by the tusche and glue method or by placing cut stencils over the open screen.<sup>1</sup>

Recent experimentation has made use of other print media to produce new effects. The woodcut and the linoleum cut have been used for offsetting designs onto the intaglio plate. These offset designs are noted for their brilliance of color.<sup>2</sup>

To offset the design from a woodcut or linoleum cut onto the intaglio plate, it is necessary to use a large gelatin brayer. The brayer must be large enough to pick up the entire design without overlapping. The brayer is then rolled over the surface of the intaglio plate, offsetting the design onto the plate.

The methods discussed in this section have dealt either with traditional multiple plate intaglio processes or the newer single plate intaglio-relief procedures. As the work progresses, those methods which are appropriate to the intended image of the print will be used where necessary to develop a print with multiple plates using intaglio and relief processes.

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<sup>1</sup>Peterdi, op. cit., p. 193.

<sup>2</sup>Buckland-Wright, op. cit., p. 171.

## IV. PROCEDURES

Before beginning work on the print, research into the problem was conducted. A survey of the history of color printmaking as it applied to the problem was undertaken. The different methods of making color prints were compiled to provide a variety of methods to choose from while developing the plates. This reduced technical barriers to the accomplishment of the intended image.

Original color prints of other artists were examined to gain insight into their color methods. These works were as follows:

Keith Achepol, Libera Me, Student Union at State University of Iowa

Douglas Cummings, Unto Us, Iowa Hall at Drake University

Mauricio Lasansky, Espana, Chicago Art Institute

My Daughter Maria Jimena, Des Moines Art Center

Spring, Des Moines Art Center

Similar research included studying reproductions of the prints of Fred Becker, Sue Fuller, Stanley William Hayter, Gabor Peterdi, and Mauricio Lasansky.

After all research was completed, work on the print began. A theme for the print was chosen, and a drawing prepared for use as a guide. Work on the plates was begun, and



the print was developed in five states.<sup>1</sup>

A discussion of the development of a color print using multiple plates with intaglio and relief processes, including photographs of the work in progress, will be presented in Chapter II.

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<sup>1</sup>A "state" is a significant point in the development of a print.

## CHAPTER II

### THE WORK

The development of a color print with multiple plates using both intaglio and relief processes will be discussed in this chapter. The order will follow the five progressive states during the development of the print. The discussion will present the theme of the print, a description of the drawing, and the procedures used during the five states to complete the print.

#### I. THE THEME

The theme chosen for the print in this project was based on the ancient Greek myth of Prometheus, specifically an image of the moment when Prometheus brings the gift of fire to man. The following quotation covers the basic myth.

When he [Prometheus] had created man, Prometheus gave him the gift of fire, which raised him above all other animals and enabled him to make use of the world about him by forging weapons and tools for agriculture. Fire was the means and the symbol of civilization. But Prometheus fell under the displeasure of Zeus for his favor toward man; for when a joint meeting was held to determine what part of beasts offered in sacrifice was due to the gods and what to men, he prepared a cunning device. He cut up an ox and divided it in two portions; in one was the flesh covered by the skin, and in the other the bones temptingly covered by fat. Then he told Zeus once for all to choose what should be his portion.

And Zeus, although he saw the deceit, chose the bones and fat, because he wanted to bring trouble on Prometheus and his creation, man. So the gods deprived men of fire and denied them their means of livelihood, until Prometheus stole it once more from heaven, bringing it secretly in a hollow reed. For this defiance of his power the god punished Prometheus by having him bound to a rock in the Caucasus Mountains, where an eagle ever tore at his liver, which ever grew again. Although at any time he might have won his freedom by telling Zeus a secret which he alone knew, the much-enduring Titan bore this torture for ages. The two were at last reconciled and Prometheus set free, by Heracles . . . the son of Zeus, who, as part divine, part human, was suited to act as mediator between<sup>1</sup> the gods and man's self-sacrificing friend and benefactor.

With this in mind, a drawing was developed.

## II. THE DRAWING

The drawing for the print, Prometheus, contained the basic visual elements needed to begin work on the copper plates. It was necessary a careful drawing precede the actual work, permitting problem areas to be solved easily with additions or erasures directly on the paper. Preliminary corrections in the drawing saved time that would have been lost during the work on the plates.

The drawing shows Prometheus bringing the gift of fire to man. The frightened leader of men looks at Prometheus, not knowing how to receive this gift. Another man, a follower, clings in fear to the leader. At the base of the group, a

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<sup>1</sup>Jessie M. Tatlock, Greek and Roman Mythology (New York: The Century Co., 1924), pp. 10 et seq.

woman stares vividly at the viewer (Figure 2).

The final drawing was done with line and in tones of gray. For the line work a hard lead pencil was used. The fine line produced by hard lead simulated the look of an engraved line. The tonal values in the drawing were made in shades of gray, even though the print would be in color. This made the value relationships more recognizable.

After completing the drawing, work on the plates was begun.

### III. THE FIRST STATE

Copper was selected for the work. The metal has long been favored by printmakers for its receptiveness to the intaglio process. It is hard enough to stand up under printing, yet soft enough to be easily engraved or etched.

The single plate to be used for the First State was cut from a large sheet of copper. The cutting was done with a draw-knife, a specially designed tool for cutting sheet metal. The size of the cut plate was fourteen inches wide by seventeen inches high.

To prepare the plate, it was first necessary to remove surface scratches and to bevel the edges. Since surface scratches often hold enough ink to print, the plate's surface



Figure 2. The drawing.

was polished smooth with Number 000 grade emery paper. The edges of the plate were beveled using a single cut mill file, finishing the preparation.

The beveling was done for two reasons. First, it eliminated the sharp edge along the sides of the plate. This edge could have cut the paper during the pressure of printing. Second, the bevel provided a gradual incline for the press roller to climb when the plate passed under the roller. The shock of jumping over a sharp edge can break a roller's axis.<sup>1</sup>

Following preparation of the plate, the basic movements of the drawing were transferred to the plate. First, the drawing was held against a window. The light from the window allowed the drawing to be seen through the paper. The elements to appear in the First State were traced with a pencil on the back of the drawing. Then, the front of the drawing was covered with chalk. With the drawing laid face down on the copper, the lines on the back of the drawing were re-traced with a hard pencil. This deposited chalk on the plate where the paper was pressed by the pencil. The tracing on the copper was a reverse, or mirror image, of the original drawing. During printing, the image reversed a second time and appeared as in the original drawing.

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<sup>1</sup>Peterdi, op. cit., p. 205.

The chalk lines were fixed on the plate with a drypoint. The drypoint is a pencil-like tool which has a sharp, steel point. When drawn across copper, it makes a furrow in the surface. The displaced copper is thrown up on the edge of the furrow. This ridge of copper, known as the burr, is what actually holds the ink. The lines from a drypoint print are soft and fuzzy because of the way the ink is held.

The drypoint was used because it makes a printable line easily and in little time. With the design for the First State fixed on the plate, it was time to run a print of the First State.

Before printing, a quality, heavy paper was cut to size and put in a tray of water to soak. The paper chosen was 110 pound offset index. Index is heavy enough to withstand the printing of several plates. Some papers have a tendency to break down. The sizing which holds the pulp together comes out and the paper sticks to plate, tearing when it is removed. The index paper was soaked for three hours to make it pliable enough to be forced down into the intaglio lines by the pressure of the press.

The black ink was mixed next. The formula used was two parts bone black, and one part vine black, with heavy plate oil added until the ink was "stringy". The ink was ground to the proper consistency by using the flat bottom of a jar. Linseed oil was added to make the ink more fluid for

easier wiping.<sup>1</sup>

The ink was put on the plate using a putty knife. Cardboard squares were used as squeegees to spread the ink over the surface and to make sure each crevice was filled with ink. Next, the plate was wiped to remove the excess ink (Figure 3).

Three tarlatan wiping rags were used for wiping. The first wiping rag was heavily saturated with ink from previous use. It was used to distribute the ink on the surface. The second rag, although not saturated like the first rag, had been used several times previously. This rag was used to remove most of the excess ink by wiping in a light, circular motion. The last rag, being almost clean, was used to finish the wiping. This still left small specks on the surface. These were not removed by hand-wiping but remained to add an interesting spotted effect to the print.

The paper was removed from the water tray and placed in the damp box. This is a box consisting of several sheets of dry blotter paper sandwiched by two wooden covers. The damp box, holding the wet paper, was placed in a surface press to speed up the blotting. After ten minutes of blotting, the paper was checked to make sure the surface film of water was

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<sup>1</sup>Ibid., p. 156.





Figure 3. Wiping the plate.

gone. A film of water would hinder the ink from adhering to the paper.

Before printing, the inked plate was placed on the press bed, and the pressure set by the hand-screws. Then, the paper was laid over the plate. This was covered by a sheet of newsprint to protect the felt blankets that were laid over the plate next. Without the newsprint, the blankets may become stiff with sizing absorbed from the damp paper, a most undesirable condition. Finally, the plate was passed through the press to secure the print.

Since the print was still damp it had to be taped to the drying board to keep it from curling while it dried. After drying, the print was taken down for examination (Figure 4).

#### IV. SECOND STATE

The color sketch was worked directly on the print of the First State. To simulate printed colors, regular colored drawing inks were used. These drawing inks were particularly suited for this purpose because they approximated the colors of printing inks, they were easily manipulated, and they were transparent enough for color mixing similar to what might be obtained from inking a relief surface over an intaglio texture.



Figure 4. First State.

The color scheme was based on a rich brown background with linear movement in black. The attire of the group of figures at the bottom of the composition was the logical place for color masses. Their clothes were colored red, green, and purple. Blue was sketched as forms in the background.

Some tentative decisions were made as to color methods. Since the color was designed in definite areas, it would be possible to carry several colors on a single plate. By combining intaglio with relief, the purple in the cape of the male figure in the lower left-hand corner could be created by using red and blue.

At that point, the decision was made to develop the print with three plates. The first plate (plate A') would carry the black line work. The second plate (plate A) would be inked in raw sienna. It would have a deeply bitten texture forming the dark background and the circular glow of the fire. The third plate (plate B) would carry the other four colors, red, blue, purple, and green.

With this plan established, work on the second plate, or plate A, could begin. It was cut, polished, and beveled in the same manner as plate A'. The first problem was to make sure the work on plate A would register with plate A'.

To accomplish this, the design of plate A' was offset

onto plate A. This was done by making a print of A' (Figure 5). Then, the print was laid face up on a table and plate A carefully placed within the edge marks made by the plate A'. The paper and plate were held by hand, carefully turned over to their proper position, set on the press bed, and printed. The pressure offset the wet ink from the print onto plate A. These lines were then fixed by drypoint.

To hold enough ink for a dark brown, plate A would have to have a deeply bitten texture. The texture was put on by the use of soft ground, which is an acid-resistant wax, containing beeswax, asphaltum, and resin.

The procedure followed for the texture was the standard one for using soft ground. First, plate A was cleaned and placed on an electric hot plate. The soft ground was melted onto the copper plate, and spread evenly with a roller. Then, the plate was removed to cool.

The material to create the texture, a coarse linen table cloth, was laid over the plate next. The peculiar quality of soft ground is it never quite hardens. When the plate, covered by the material, was passed through the press, the texture of the material was pressed into the ground. As the material was removed, tiny openings were left in the ground.

Before placing plate A in the acid, the areas to be



Figure 5. Running a proof.

left untextured were painted with an acid-resistant liquid, in this case, orange shellac. The back and edges of the plate were also protected in the same way. The plate was then placed in the acid to bite the texture into the copper. It took seven hours to bite the plate deep enough to obtain the strong texture that was desired. This time was dependent on the age and strength of the acid used. After biting, the plate was removed, and washed with water and turpentine to remove the acid and the soft ground.

The third plate, or plate B, was prepared while plate A was being bitten in the acid. The same procedure, including offsetting the design from plate A' and fixing it with drypoint, was followed. When this was completed, a print of the Second State was made.

Before inking the plates for the Second State, it was necessary to mix the color inks. Powdered pigments of raw sienna, thalo blue, alizarin crimson, and chromium oxide green were obtained. These were each ground separately with heavy plate oil. More linseed oil was used than with the black ink, because color inks are more difficult to wipe than black.<sup>1</sup>

Since plates are usually printed from lighter colors to darker colors, plate B was inked first using the à la poupée method.<sup>2</sup> The colors were placed on the surface of the

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<sup>1</sup>Hayter, op. cit., p. 130.    <sup>2</sup>Peterdi, op. cit., p. 183.

plate using small pieces of soft cloth. Next, plate A was inked with raw sienna. Finally, plate A' was inked with black ink. Separate wiping rags were used for wiping the different colors.

A primary concern was registration, or making sure all three plates would print in the same position. To ensure proper registration, plate B was laid on the press bed, and its position marked with a pencil. The paper, already soaked and blotted, was removed from the damp box and placed over the plate. When the print was run through the press, care was taken to leave the end part of the paper and blankets held tight by the roller. The paper, newsprint, and blankets were then folded back over the roller (Figure 6). Plate B was removed and plate A carefully placed within the pencil marks, aiding proper registration. The procedure was repeated for plate A'. The print was then removed and taped to the drying boards to dry.

The proof was examined with care to determine what would be done next. The background was not rich and dark as had been intended which made it difficult to plan further steps. To correct this, another proof was made using the Lasansky method.<sup>1</sup> This was done by printing plate B as before, followed by plate A inked with raw sienna. Plate A

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<sup>1</sup>Supra, p. 10.





Figure 6. Lifting the paper and blankets after printing.

was then removed, cleaned with turpentine, inked black, and run through the press again.

The result of overprinting raw sienna with black was a vivid, vibrant, rich brown. The method was so successful plate A' was discarded and the work continued with plate A and B. Since this proof could be used to determine further work, it was considered a significant point in the development and designated as the Second State (Figure 7).

#### V. THE THIRD STATE

The Second State was examined after it dried. The Lasansky method had given the desired effect by making the background darker than in the previous proof. However, there was a problem with registration using this method. The paper had shrunk during the interval of reinking for the overprinting. Leaving the end of the paper held by the roller to keep it from moving was satisfactory for immediate multiple plate printing, but not where there was a delay for reinking, as in the Lasansky method.

The à la poupée method used in the color inking was unsatisfactory because of the variation between proofs. This tendency to monoprint was due to uncontrolled color areas. Inking through stencils was chosen as a means of providing the necessary control.



Figure 7. Second State.

The next step was to sketch the shading to be used on the figures. This was done with pencil directly on a proof of the Second State. Since aquatint was to be used to make the tonal areas, the shading was sketched in steps of gray. The description of the procedure for producing aquatint will explain why this was done.

To produce the aquatint, plate A was first dusted with an acid resistant resin. Then, the plate was heated causing the resin to melt and adhere to the plate. After the plate cooled, the areas which were to be white were stopped out with shellac.

When the shellac dried, the plate was put in the acid for two minutes to bite the lightest value. The acid attacks the tiny spaces between the resin particles. The longer the exposure to acid, the deeper the spaces around the particles are bitten. This creates a dot pattern which appears as a tone in the print. The darkness of the tone depends on the depth of these spaces, or ink holding depressions.

After biting the lightest tone, the plate was removed and the light areas stopped out with orange shellac. The shellac protected them from further biting. This biting and stopping out process was repeated through five separate biting periods until the plate had a deep bite, which would print as the darkest tone. The shellac and resin particles

were washed off with wood alcohol after all biting was completed.

A proof was made at this point to see the effect of the aquatint. Two experiments to correct the registration were tried, both of them unsuccessful. The first proof was made by printing plate A with sienna, and folding the paper back over the rollers. The paper was covered with a damp blotter to keep it from shrinking. This did not stop the shrinkage, however.

On the second proof, the paper was replaced in the water tray after the first printing. This had the opposite effect as the first experiment. The paper expanded in the water which made the raw sienna image appear larger than the black image, while on the first experiment the sienna image was smaller than the black one.

Even with the disturbing effects of poor registration, the values made by the aquatint were still perceivable. In some areas, such as on the body of Prometheus, the transitions from light to dark were very crude. To correct this, the burnisher, a small, curved, steel tool, was rubbed over the aquatinted portions of the plate to lighten areas by smoothing down the high points, thus creating shallower depressions which hold less ink. To make white areas, the scraper, a sharp edged, triangular shaped, steel tool, was used to scrape

away the higher portions of the aquatint and leave a smooth surface.

Line was added to plate A to define shapes and details. This was done by engraving with the burin (Figure 9). The burin was used to delineate the outlines of the figures and to define their features. For heavy lines, it was necessary to place several burin lines side by side with no appreciable space separation since the burin engraves a very fine line.

After the engraving, plate A was laid aside and work was begun on plate B. Since color transparency was needed to create the sensation of purple in the cape, a deep, textured area was bitten into plate B. The textured area would also hold ink for the other intaglio colors.

The texture was achieved with soft ground in the same way used for the texture of plate A. The same coarse linen material was used for the texture for two reasons. First, the bitten texture provided a deep intaglio while still maintaining the surface structure of the cross threads. This meant it could be used for relief over intaglio to create transparency, and thus, a visual mixing of opaque colors. Secondly, the use of the same texture would have a unifying effect between plate A and plate B. In a print with as many diverse elements as Prometheus, this was a definite advantage.

While plate B was being bitten in the acid, the stencils



Figure 8. Relief inking through the stencil.



Figure 9. Engraving with the burin.



were prepared. First, a form to hold the plate was cut from illustration board. This consisted of a window fourteen inches by seventeen inches (the size of the plates) surrounded by a margin of board two inches wide. The margin was necessary for attaching the hinged stencils.

The next step was the cutting of the stencils. The first stencils were cut from heavy manila paper but the material proved unsatisfactory. First, the opacity of the paper made it difficult to transfer the design of the color areas onto the stencils. Second, relief inking of small areas through the stencil was impossible because the thickness of the paper prevented the hard brayer from inking the edges of the color areas.

To eliminate the two problems, these changes were made. The stencils were recut in thin, clear acetate. Registering the acetate stencils was a simple problem. The stencil was attached to the form by a hinge of masking tape. Plate A was then placed in the form and the color areas for the stencil were cut through the clear acetate. With plate B in place, the stencils would be in the exact position for perfect register.

The second problem of inking through the stencils was solved by using a semi-hard rubber brayer. The brayer was soft enough to penetrate the thin acetate stencil, but hard enough to keep from inking the lower intaglio.

The acetate stencils were attached to the form and cut over plate A as described. Three stencils were used for the colors green, red, and blue. The purple was created by combining red intaglio with blue relief.

After preparation of the stencils, it was possible to ink for the printing of the Third State. Plate B was inked first by inking through the red and green stencils with folded cloths to fill the intaglio texture. Then, the blue stencil was laid over the plate, and relief blue was rolled through the stencil and over the intaglio red to create the purple for the cape. Vivid blue, a commercially prepared, oil-based, block printing ink, was used for this relief inking (Figure 8). The other areas of blue were inked with the thalo blue intaglio ink by using a folded cloth. The form in the upper righthand corner was inked with thalo blue by the à la poupée method. The raw sienna was inked on plate A next, using the inking method described for the previous states.

The printing of this stage was begun by running plate B first, followed by plate A. Since these two plates were printed one after another, register was achieved by leaving the paper held under the roller and placing the two plates in the same position on the press bed. After printing plate A, the paper was removed from the press and placed between two damp blotters to keep it from shrinking. This was placed in

the damp box and put in the surface press. Plate A was cleaned and reinked with black. The paper was then removed, laid face up on a table, and plate A placed over it within the platemark of the previous printings. The plate and paper were turned over to put the plate in its proper position, laid on the press bed, and printed. The registration of this printing was perfect (Figure 10).

## VI. FOURTH STATE

The Fourth State was needed to carry on work not completed in the Third State. This included using the burin to strengthen the line work in the figures. The contrast of light and dark patterns was also developed by using the burnisher and scraper to lighten areas, and the drypoint to darken other areas.

The background in the Third State printed lighter than had been expected. The drypoint was used to darken this area by crosshatching. Crosshatching created more ink retaining furrows.

A few changes were made in the color stencils before printing the Fourth State. The green stencil was recut with smaller openings to keep the color from spreading into undesired areas as it had in the Third State. The red stencil was altered to bring more red into the glow from the flame.



Figure 10. Third State.

The blue stencil was opened to allow more blues in the background. By combining the dark blue color with the drypoint darkened background, a deep, dark, spatial effect could be achieved.

In the print of the Third State, the cape area was a flat, strong, abstract shape that detracted from the rest of the print. To correct this, the blue stencil was recut with a jagged edge on the hood of the cape. The jagged edge created the impression of folded cloth, thus softening the appearance of the cape.

Since the combination of relief inked vivid blue over the bitten texture inked in intaglio red had printed as a purple with a strong blue quality, the order of the inking was reversed. Magenta, a commercially prepared, oil based, relief ink, was rolled onto the cross threads of the bitten texture now carrying the thalo blue ink. A purple of stronger red quality was created because the surface cross threads held more ink than the intaglio texture.

During the inking, one important difficulty was noted. The acetate had a tendency to stick to the brayer at the end of each roll. This caused a tear to develop in the stencil. The difficulty was overcome by exercising care when lifting the brayer from the stencil.

The Fourth State was printed with satisfactory results (Figure 11).



Figure 11. Fourth State.

## VII. FIFTH STATE

The Fourth State was examined carefully (Figure 12). The line work was satisfactory. The colors had printed in their proper positions and intensity. All that remained was to darken the background more with the drypoint.

The Fifth State was printed and the edition set at ten.



Figure 12. Examining and sketching on the proof.



## CHAPTER III

### MATERIALS AND EQUIPMENT USED

The large number of different materials and items of equipment can best be dealt with in their relationship to the development of the print.

#### I. MATERIALS USED

The various materials used in the project were:

DRAWING: Strathmore Alexis white paper

WORKING THE PLATES AND PREPARING THE STENCIL:

thirty-two ounce cold rolled sheet copper

Number 000 grade emery paper for polishing plates

soft ground for carrying texture impressions

linen table cloth for creating texture

resin, fine grind, used with acid for producing

aquatint

orange shellac for stopping-out

iron perchloride crystals for mixing acid

black, brown, yellow, red, and blue drawing inks for

working out the color plan on proofs

cold press illustration board for the stencil form

clear, thin acetate for stencils

one-half inch width masking tape for hinging stencils

to the form

## PREPARING THE INKS:

vine black, bone black, raw wienna, thalo blue,  
chromium oxide green, and alizarin crimson dry  
pigments

heavy plate oil for intaglio medium

linseed oil to make the ink easier to wipe

## INKING THE PLATES:

vivid blue and magenta, commercially prepared, oil  
based, block printing inks for relief inking  
cardboard squares for spreading the ink  
tarlatan cloth for wiping rags

## CLEANING MATERIALS:

turpentine for cleaning ink from plates  
wood alcohol for removing shellac

## OTHER MATERIALS:

paper tape for stretching damp proofs  
machine oil used on sharpening stone

## II. EQUIPMENT USED

The various items of equipment used in the project were:

## DRAWING AND CORRECTIONS ON THE PROOFS:

pencils, pens, brushes

## CUTTING AND PREPARING THE PLATE:

ruler

drawknife for cutting copper

ten-inch mill file for beveling plate edges

#### WORKING THE PLATES AND PREPARING THE STENCIL:

drypoint for fixing transferred images and darkening areas

silk bag for holding resin while dusting the plate

hot plate for heating plate prior to laying soft

ground or for melting resin

brayer for smoothing soft ground

burin for engraving lines

India stone for sharpening burin

graver sharpening for holding burin in proper position while sharpening

burnisher for lightening aquatinted areas

scraper for removing texture and aquatint

razor knife for cutting stencil

#### PRINTING:

water tray for soaking paper

damp box for blotting excess water from paper

surface press for applying pressure to damp box

glass jars for grinding and storing inks

putty knife for applying ink to plates

semi-hard rubber brayer for relief inking

hand operated etching press for printing  
felt blankets for equalizing pressure and softening  
the contact between the steel roller and the copper  
plate

OTHER EQUIPMENT:

drying boards for stretching damp proofs  
toothbrush for cleaning ink out of plate



Figure 13. Materials and equipment used in this project.

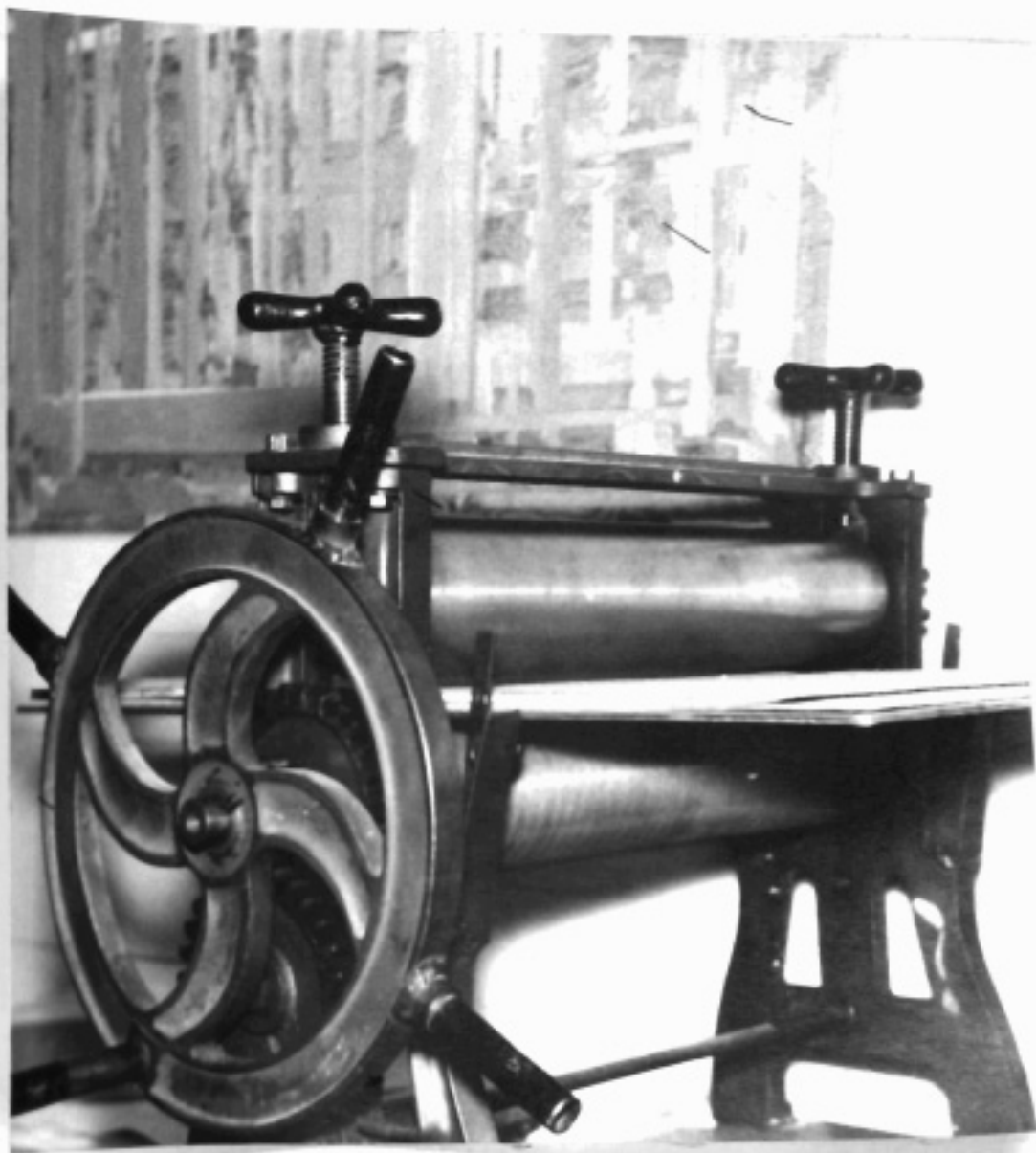


Figure 14. The hand operated etching press.



Figure 15. The surface press, the damp box, and the acid tray.

## CHAPTER IV

### SUMMARY AND CONCLUSIONS

#### I. SUMMARY

The project discussed in this study concerned the development of a color print with multiple plates using both relief and intaglio processes. The purpose of the project was to combine the traditional multiple intaglio color process with the newer single plate intaglio-relief color methods. This combination produced a greater technical flexibility with wider range of visual effects than by using either multiple plates or single plate intaglio-relief alone.

Before beginning the actual work, a survey of the history of color intaglio printmaking was made to gain background into the problem. The different methods of obtaining color were compiled to reduce technical barriers. The research phase was completed by studying the color prints of other artists.

The work began when a theme for the print was chosen. The theme was the myth of Prometheus. A drawing based on this theme was developed for use as a guide.

The print was developed in five states. The plates were worked using the intaglio processes of engraving, dry-



point, soft ground, burnishing, scraping, and aquatint. Throughout the development of the print, different methods of producing color with multiple plates using intaglio and relief processes were tried. The different methods were accepted or rejected depending upon their compatibility with the visual concept of the print.

The final print was titled Prometheus. It was printed from two copper plates. Eight colors were printed from these two plates by combining traditional multiple color intaglio processes with the newer single plate intaglio-relief methods.

## II. CONCLUSIONS

The development of the color print Prometheus led to the following conclusions.

Multiple copper plates using intaglio and relief processes offer technical flexibility and a wide range of visual effects for color printmaking. This was the case with Prometheus. The printing of eight colors by relief and intaglio processes to give the same visual effect as in Prometheus would have been impossible using traditional multiple plate intaglio methods, nor could the intricacies of intaglio color produced by three overprintings have been achieved using a single intaglio-relief plate. By using multiple plates with intaglio and relief processes, the variety of effects in

Prometheus was obtained and the intended visual image achieved.

Color intaglio printmaking presents a technical challenge to the printmaker. To avoid technical barriers from suppressing visual intentions, it is important for the printmaker to be familiar with the different methods for obtaining color. He must be ready to experiment with untried methods and incorporate them into his print when they add to the visual concept. Conversely, he must be ready to reject those methods which do not achieve the intended effects and would detract from the visual concept.

The Lasansky method of overprinting two colors from the same plate was important in the development of the print. The color achieved by overprinting a warm color with a cool color is extremely vibrant and exciting. Since the method depended on the exact register for proper overprinting, the paper was prevented from shrinking between printings by placing it between damp blotters in the damp box and keeping it under pressure.

The à la poupée method proved to be limited to defined areas. Unless used with specially designated aquatint areas, monoprinting was difficult to avoid. However, where there was a defined area, such as the top right-hand corner of Prometheus, which is a dark, aquatint area adjacent to a light, smooth area, the à la poupée method was found to be satisfactory.

Making opaque color visually transparent to create visual color mixing is a major advantage of combining relief with intaglio. In Prometheus, this was done by inking relief magenta over a bitten texture inked with intaglio blue to create the purple cape. The transparency was also used to lighten the blue in the background.

For relief inking, the best results were obtained with commercially prepared, oil based, block printing inks. The intaglio inks did not have enough body to show up well in surface inking. Black printing inks are specially made for the relief media, such as woodcut or linoleum cut. They have a heavier body which adheres to the surface better.

The clear, thin acetate used in making the stencils was superior to opaque, heavy manila paper. Because it was clear, the color areas could be cut over the line work on plate A. This meant the area would be in exact register for inking on plate B. Also, the acetate was thin enough to permit small openings to be inked by relief using a semi-hard rubber brayer. The manila paper was too thick to allow the brayer to reach the surface for inking. However, the thin acetate required special care to avoid tearing the stencil when lifting the brayer.

The project was to develop a color print by combining the traditional multiple color intaglio processes with the

newer single plate intaglio-relief methods. This combination proved entirely successful in the color print, Prometheus.

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